Listing of Claims

The following listing of claims replaces all prior versions and listings of claims in the application.

1. (Original): An active diffraction grating comprising an optical waveguide formed on a two-dimensional plane and electrodes formed on both sides of the optical waveguide, wherein one of the electrodes is formed as plural spot electrodes at a constant spacing in a matrix form on the two-dimensional plane, and with respect to the size of the spot electrodes and the distance between the spot electrodes, the spot electrodes are small and dense enough to function as a line when the spot electrodes are arrayed in a straight line within the diameter of light incident on the optical waveguide, and wherein plural spot electrodes of the spot electrodes arranged in the matrix form are selected and a voltage is applied thereto so as to form at least two parallel lines having a predetermined angle to the traveling direction of the light incident on the optical waveguide, and when the light incident on the two-dimensional plane waveguide is reflected by said at least two parallel lines, the refractive index of the optical waveguide is partly changed so that the wavelength of the light, the angle of said at least two lines to the incident light and the distance between the lines satisfy a Bragg reflection condition.

2. (Original): The active diffraction grating as claimed in claim 1, wherein the optical waveguide comprises a semiconductor core layer doped with n-type (or p-type) and a clad layer

doped with p-type (or n-type), and at least one of the electrodes formed on both sides of the optical waveguide is formed as spot electrodes.

3. (Currently amended): The active diffraction grating as claimed in claim [[2 or 3]] 1 or 2, wherein plural incidence units and plural emission units are arranged around the two-dimensional plane, and plural group electrodes are formed, each of which has plural spot electrodes of the spot electrodes arranged in the matrix form as a unit, the plural group electrodes being arranged at cross points on the optical waveguide where lines extending from the plural incidence and emission units intersect each other, and a voltage applied to spot electrodes of an arbitrary group electrode of the group electrodes arranged at the cross points is controlled to change the refractive index at the parts where the spot electrodes are formed, so that diffracted light of light incident on an arbitrary incidence unit becomes incident on an arbitrary emission unit.

4. (Original): The active diffraction grating as claimed in claim 3, wherein an algorithm function for realizing optimum control is used as a measure for applying a voltage to the group electrode.